



Unmanned Combat Air Vehicle (UCAV) Summary Fact Sheet



Overview

The Unmanned Combat Air Vehicle (UCAV) System Demonstration Program is a joint DARPA/Air Force/Boeing effort to demonstrate the technical feasibility for a UCAV system to effectively and affordably prosecute 21st century Suppression of Enemy Air Defenses (SEAD) and strike missions within the emerging global command and control architecture. The Air Force is committed to an aggressive program of exploiting UAV technology for SEAD in the mid-term and moving into a broader range of combat missions depending on technology maturation, affordability, and migration to other forms of warfare. The UCAV System Demonstration Program will provide the information necessary to enable decision-makers to determine whether it is technically and fiscally prudent to continue effects-based development of a UCAV system to perform the SEAD/Strike mission. The knowledge gained from the System Demonstration Program will be a key input to defining the best force mix for the 2010 timeframe. Separate fact sheets with additional detail are available for each of the following areas.

UCAV Operational System (UOS)

The Unmanned Combat Air Vehicle vision is to develop an affordable weapon system that expands tactical mission options and provides revolutionary new air power. The UCAV weapon system will exploit the design and operational freedoms of relocating the pilot outside of the vehicle to enable a new paradigm in aircraft affordability while maintaining the rationale, judgment, and moral qualities of the human operator. The weapon system will require minimal maintenance, could be stored for extended periods of time, and will be capable of dynamic mission control while engaging multiple targets in a single mission under minimal human supervision. Such a UCAV weapon system has the potential to fully exploit the emerging information revolution and provide advanced airpower with increased tactical deterrence at a fraction of the total life cycle costs of current manned systems.

The initial operational role for the UCAV is as a "first day of the war" force enabler that will complement a strike package by performing the SEAD mission. In this role, UCAVs would accomplish preemptive destruction of sophisticated enemy integrated air defenses (IADs) in advance of the strike package, and enable the attacking forces by providing reactive suppression against the remaining IADs. Throughout the rest of the campaign, UCAVs would provide continuous vigilance with an immediate lethal strike capability to prosecute high value and time critical targets. This SEAD/Strike mission will be the first instantiation of the UCAV vision that will evolve to include a broader range of combat missions as the concept and technologies mature, and the UCAV affordability potential is realized.

The UCAV weapon system will enable a new affordability paradigm by reducing both acquisition, and operation and support (O&S) costs. A UCAV air vehicle unit recurring flyaway (URF) cost approximately one-half that of an F-16CJ is seen as achievable. Removing the pilot from the vehicle eliminates man-rating requirements, pilot systems, and interfaces. New design

philosophies can be used to optimize the design for aerodynamics, signature, reduced maintenance and low cost manufacturing processes and will result in a smaller, simpler aircraft. Advances in small smart munitions will allow these smaller vehicles to attack multiple targets during a single mission and reduce the cost per target killed.

This UCAV vision looks towards a revolutionary new set of options with enormous long-term payoffs to US air power in terms of expanded mission options, tactical deterrence and most importantly, affordability.

UCAV System Demonstration Program

The objective of the UCAV System Demonstration Program is to design, develop, integrate, and demonstrate the critical technologies, processes, and system attributes pertaining to the UCAV Operational System. The critical technology areas are command, control, and communications, human-systems interaction, targeting/weapons delivery, and air vehicle design.

The specific objectives of the UCAV System Demonstration Program include:

- Develop and demonstrate a low life-cycle cost, mission effective design for a SEAD/Strike unmanned air vehicle;
- Develop and demonstrate a re-configurable control station for multi-ship operations;
- Demonstrate robust/secure command, control and communications, including line-of-sight and over-the-horizon;
- Explore the full range of human-computer function allocation, dynamic mission planning and management approaches;
- Evaluate off-board/on-board sensor integration, weapon targeting and loadouts;
- Demonstrate human-in-the-loop: detection, identification, location, real-time targeting, weapons authorization, weapons delivery and target damage indication; and
- Continue refinement of the operational SEAD/Strike UCAV design and assessment of its projected effectiveness and affordability.

X-45A Demonstrator System

The UCAV System Demonstration Program has at its core the successful completion of over 200 demonstration events. The first half of these will be conducted exclusively by the X-45A demonstrator system in demonstration Blocks one through three, the second half will be conducted by the X-45B demonstrator system and upgraded X-45A aircraft participating in multi-ship demonstrations. These events include analysis, component developments, simulations, ground tests and flight tests. The demonstrator tool set that is being developed to support these demonstrations consists of four principle elements: a sophisticated system simulation; a set of representative air vehicles; a suite of mission control items; and, key supportability-related components.

Two X-45A air vehicles have been built, both having the same outer moldline and aeropropulsion integration as initially envisioned for the UCAV operational system. The 15,000 lb (gross weight) X-45A vehicles are approximately 27 feet long, seven feet high and 34 feet wide. The X-45A can be transported in a storage container in a C-5 or C-17. The mission control console is incorporated into both the UCAV mission control station trailer for local control at the test site (NASA Dryden Flight Research Center) and in the simulation laboratory for distributed control and operator workload experiments. Based on commercial technology, it provides the operator with the decision aids and situation awareness necessary to control up to four air vehicles simultaneously.

X-45B Demonstrator System

In addition to two X-45A vehicles currently being tested, design of a third demonstrator system (X-45B air vehicle, mission control system, and support segment) is currently underway and will join the demonstration program in early 2005. The larger X-45B will more closely represent the operational system as currently envisioned, to include integrated avionics, two fully functional weapons bays, incorporation of low observable technologies, and provisions for the full sensor suite, MILSTAR, and aerial refueling. A second generation container system and mission control system shelter will also be developed.

Point of Contact

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